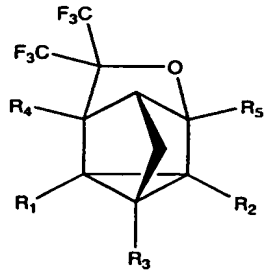
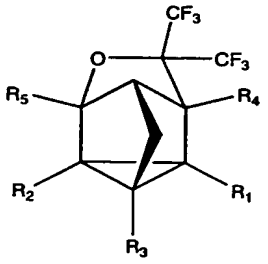
CLAIMS

1. A fluorine-containing cyclic compound represented by the following formula (1) or (2),



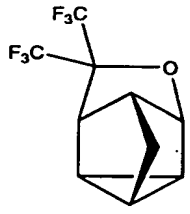
(1)



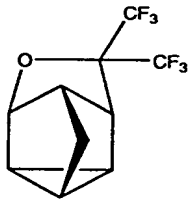
(2)

wherein, in the formulas (1) and (2), each of R1, R2, R3, R4 and R5 is independently selected from the group consisting of hydrogen, alkyl group, hydroxyl group, halogen atom, halogenated alkyl group, carbinol group, and hexafluorocarbinol group; wherein the hexafluorocarbinol group contained in the formula may be partially or entirely protected; and wherein the protecting group is a straight-chain, branched or cyclic hydrocarbon group of a carbon number of 1-25 or a group containing an aromatic hydrocarbon group and may contain at least one of fluorine atom, oxygen atom, nitrogen atom and carbonyl bond.

2. A fluorine-containing cyclic compound represented by the following formula (3) or (4).

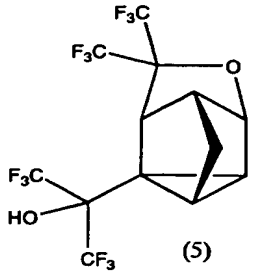


(3)

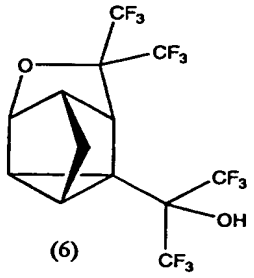


(4)

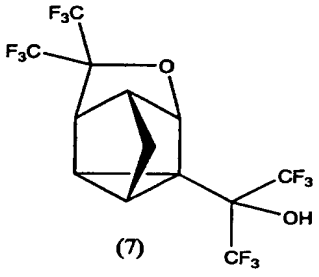
3. A fluorine-containing cyclic compound represented by one of the following formulas (5) to (8).



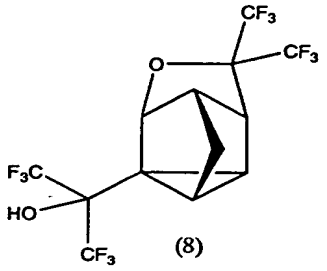
(5)



(6)

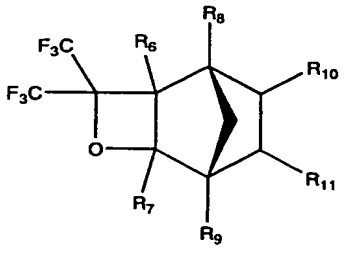


(7)

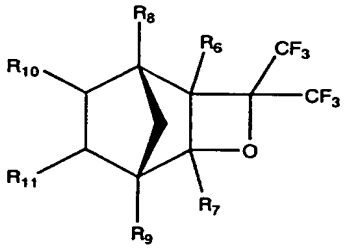


(8)

4. A fluorine-containing cyclic compound that is derived from a fluorine-containing cyclic compound according to one of claims 1 to 3 and is represented by the following formula (9) or (10),



(9)

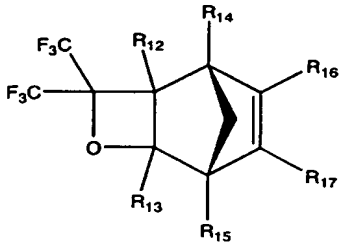


(10)

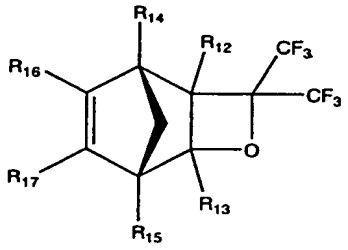
wherein, in the formulas (9) and (10), each of R6, R7, R8, R9, R10 and R11 is independently selected from the group consisting of hydrogen, alkyl group, halogenated alkyl group, hydroxyl group, alkyloxy group, halogenated alkyloxy group, mercapto group, alkylthio group, halogenated alkylthio group, sulfoxy group, alkylsulfonyloxy group, halogenated alkylsulfonyloxy group, alkylsilyl

group, halogenated alkylsilyl group, alkoxysilyl group, halogen atom, amino group, alkylamino group, carbinol group, and hexafluorocarbinol group; wherein the hexafluorocarbinol group contained in the formula may be partially or entirely protected; and wherein the protecting group is a straight-chain, branched or cyclic hydrocarbon group of a carbon number of 1-25 or a group containing an aromatic hydrocarbon group and may contain at least one of fluorine atom, oxygen atom, nitrogen atom and carbonyl bond.

5. A fluorine-containing cyclic compound that is derived from a fluorine-containing cyclic compound according to one of claims 1 to 4 and is represented by the following formula (11) or (12),



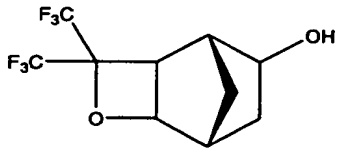
(11)



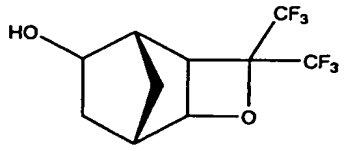
(12)

wherein, in the formulas (11) and (12), each of R12, R13, R14, R15, R16 and R17 is independently selected from the group consisting of hydrogen, alkyl group, halogenated alkyl group, hydroxyl group, alkyloxy group, halogenated alkyloxy group, mercapto group, alkylthio group, halogenated alkylthio group, sulfoxy group, alkylsulfonyloxy group, halogenated alkylsulfonyloxy group, alkylsilyl group, halogenated alkylsilyl group, alkoxysilyl group, halogen atom, amino group, alkylamino group, carbinol group, and hexafluorocarbinol group; wherein the hexafluorocarbinol group contained in the formula may be partially or entirely protected; and wherein the protecting group is a straight-chain, branched or cyclic hydrocarbon group of a carbon number of 1-25 or a group containing an aromatic hydrocarbon group and may contain at least one of fluorine atom, oxygen atom, nitrogen atom and carbonyl bond.

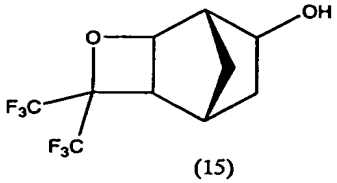
6. A fluorine-containing cyclic compound represented by one of the following formulas (13) to (16).



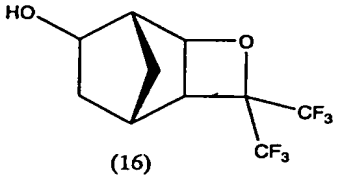
(13)



(14)

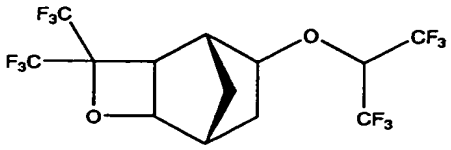


(15)

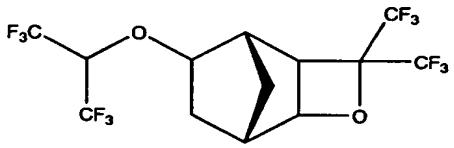


(16)

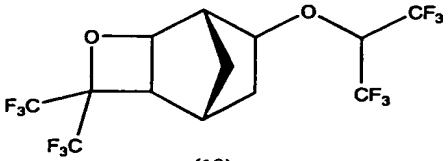
7. A fluorine-containing cyclic compound represented by one of the following formulas (17) to (20).



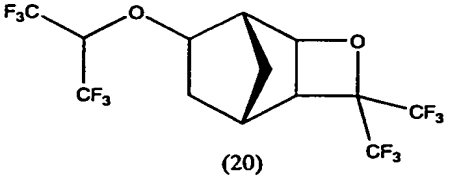
(17)



(18)

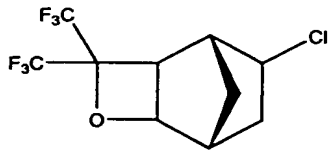


(19)

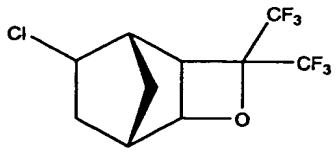


(20)

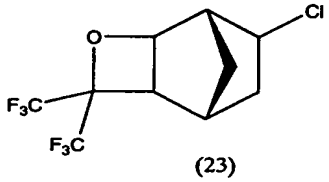
8. A fluorine-containing cyclic compound represented by one of the following formulas (21) to (24).



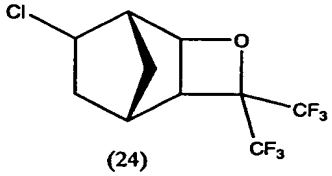
(21)



(22)

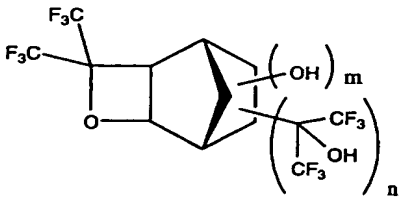


(23)

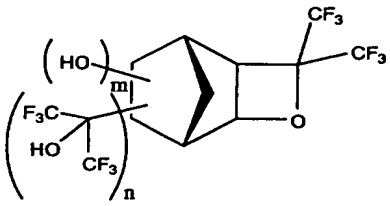


(24)

9. A fluorine-containing cyclic compound having at least one hydroxyl group or hexafluorocarbinol group and represented by the following structural formula (25) or (26),



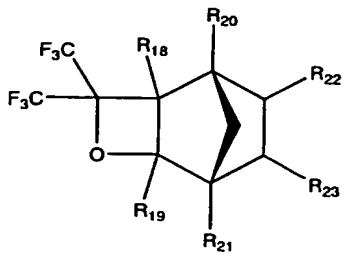
(25)



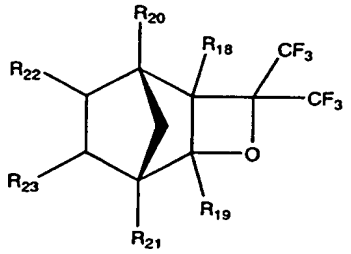
(26)

wherein, in the structural formulas (25) and (26), "m+n" represents an integer of 1 to 4; wherein the hydroxyl group and the hexafluorocarbinol group contained in the formula may be partially or entirely protected; and wherein the protecting group is a straight-chain, branched or cyclic hydrocarbon group of a carbon number of 1-25 or a group containing an aromatic hydrocarbon group and may contain at least one of fluorine atom, oxygen atom, nitrogen atom and carbonyl bond.

10. A fluorine-containing polymerizable monomer that is derived from a fluorine-containing cyclic compound according to one of claims 1-9 and is represented by the following formula (27) or (28),

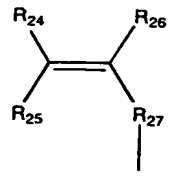


(27)



(28)

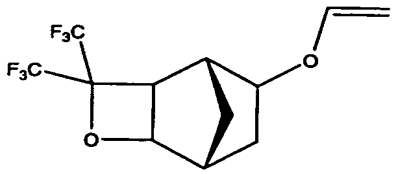
wherein, in the formulas (27) and (28), one of R18, R19, R20, R21, R22 and R23 is a polymerizable group represented by the formula (29); wherein, of R18, R19, R20, R21, R22 and R23, groups other than the polymerizable group are selected from the group consisting of hydrogen, alkyl group, halogenated alkyl group, hydroxyl group, alkyloxy group, halogenated alkyloxy group, mercapto group, alkylthio group, halogenated alkylthio group, sulfoxy group, alkylsulfonyloxy group, halogenated alkylsulfonyloxy group, alkylsilyl group, halogenated alkylsilyl group, alkoxysilyl group, halogen atom, amino group, alkylamino group, carbinol group, and hexafluorocarbinol group; wherein the hexafluorocarbinol group contained in the formulas (27) and (28) may be partially or entirely protected; wherein the protecting group is a straight-chain, branched or cyclic hydrocarbon group of a carbon number of 1-25 or a group containing an aromatic hydrocarbon group and may contain at least one of fluorine atom, oxygen atom, nitrogen atom and carbonyl bond; wherein, in the formula (29), each of R24, R25 and R26 is independently a hydrogen atom, a fluorine atom or a straight-chain, branched or cyclic alkyl group or fluorinated alkyl group having a carbon number of 1-25; and wherein R27 represents a single bond or methylene group, a straight-chain, branched or cyclic alkylene group of a carbon number of 2-20, a straight-chain, branched or cyclic alkylene group of a carbon number of 2-20, an oxygen atom, a sulfur atom, –(C=O)O–, –O(C=O) –, or dialkylsilylene group.



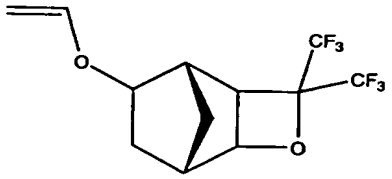
(29)

11. A fluorine-containing polymerizable monomer, wherein a polymerizable monomer according to claim 10 is an acrylic ester, methacrylic ester, α-trifluoromethylacrylic ester, vinyl ether or allyl ether.

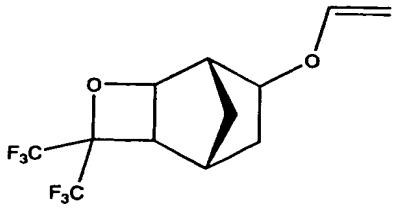
12. A fluorine-containing polymerizable monomer represented by one of the following formulas (30) to (33).



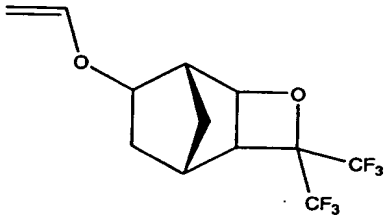
(30)



(31)

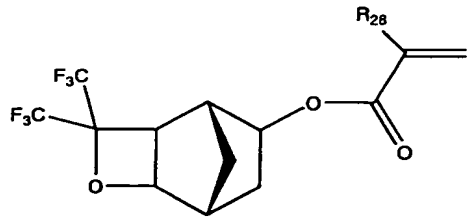


(32)

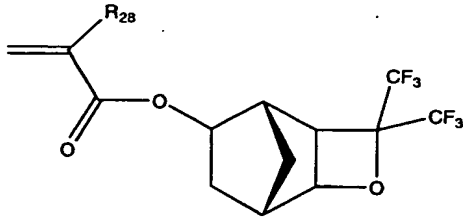


(33)

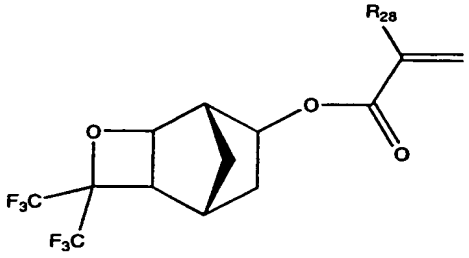
13. A fluorine-containing polymerizable monomer represented by one of the following formulas (34) to (37),



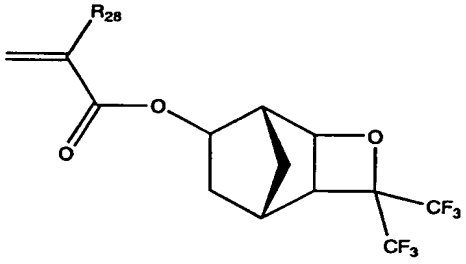
(34)



(35)



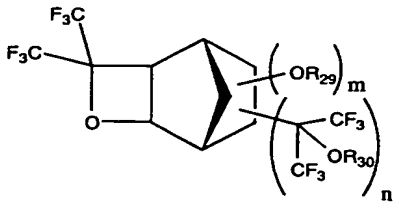
(36)



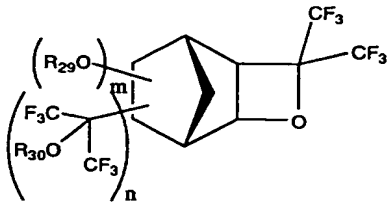
(37)

wherein, in the formulas (34) to (37), R28 represents a hydrogen, methyl group, fluorine, or trifluoromethyl group.

14. A fluorine-containing cyclic compound represented by the following structural formula (38) or (39) and having at least one polymerizable group,



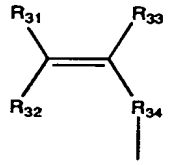
(38)



(39)

wherein, in the structural formulas (38) and (39), "m+n" represents an integer of 1 to 4; wherein at least one of R29 and R30 is a polymerizable group represented by the formula (40); wherein of R29 and R30, a group other than the polymerizable group represents a hydrogen or protecting group; and wherein the protecting group is a straight-chain, branched or cyclic

hydrocarbon group of a carbon number of 1-20 or a group containing an aromatic hydrocarbon group and may contain at least one of fluorine atom, oxygen atom, nitrogen atom and carbonyl bond; wherein, in the following formula (40), each of R31, R32 and R33 is independently a hydrogen atom, fluorine atom, or a straight-chain, branched or cyclic alkyl group or fluorinated alkyl group of a carbon number of 1-25; and wherein R34 represents a single bond or methylene group, a straight-chain, branched or cyclic alkylene group of a carbon number of 2-20, a straight-chain, branched or cyclic fluorinated alkylene group, a carbonyl group or dialkylsilylene group.



(40)

15. A fluorine-containing cyclic compound, wherein the hexafluorocarbinol group contained in the fluorine-containing cyclic compound according to one of claims 1 to 14 is partially or fully protected with an acid-labile group.

16. A fluorine-containing high-molecular compound prepared by a polymerization or copolymerization using a fluorine-containing cyclic compound according to one of claims 1 to 15.

17. A resist material using a fluorine-containing high-molecular compound according to claim 16.

18. A pattern forming process using a resist material according to claim 17.